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(71) Applicant(s)
KIEVSKY NAUCHNO-ISSLEDOVATELSKY INSTITUT NEIROKHIRURGII

(72) Inventor(s)
VIKTOR IVANOVICH SCHEGLOV; ALEXANDR GRIGORIEVICH SAVENKO; SERGEI ANDREEVICH ROMODANOV; FEDOR ANDREEVICH SERBINENKO; ALEXEI VASILIEVICH KOBTSEV

(74) Attorney or Agent
GRIFFITH HACK & CO. , GPO Box 4164, SYDNEY NSW 2001

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(57) Claim

1. An occuluding device, comprising a detachable distensible balloon accommodating a radiopaque marker and connected via a sphincter, to an insertable catheter, wherein the balloon incorporates at least one first annular bead or collar arranged round the sphincter.

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МЕЖДУНАРОДНАЯ ЗАЯВКА, ОПУБЛИКОВАННАЯ В СООТВЕТСТВИИ С ДОГОВОРОМ О ПАТЕНТНОЙ КООПЕРАЦИИ (PCT)

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(71) Заявитель *(для всех указанных государств, кроме US)*: КИЕВСКИЙ НАУЧНО–ИССЛЕДОВАТЕЛЬСКИЙ ИНСТИТУТ НЕЙРОХИРУРГИИ [SU/SU]; Киев 252655, ул. Мануильского, д. 32 (SU) [KIEVSKY NAUCHNO–ISSLEDOVATELSKY INSTITUT NEIROKHIRURGII, Kiev (SU)].

(72) Изобретатели, и

(75) Изобретатели/Заявители *(только для US)*: ЩЕГЛОВ Виктор Иванович [SU/SU]; Киев 252119, ул. Белорусская, д. 15б, кв. 51 (SU) [SCHEGLOV, Viktor Ivanovich, Kiev (SU)]. САВЕНКО Александр Григорьевич [SU/SU]; Киев 252050, ул. Мурашко, д. 5, кв. 100 (SU) [SAVENKO, Alexandr Grigorievich, Kiev (SU)]. РОМОДАНОВ Сергей Андреевич [SU/SU]; Киев 252036, ул. Артема, д. 8, кв. 56 (SU) [ROMODANOV, Sergei Andreevich, Kiev (SU)]. СЕРБИНЕНКО Федор Андреевич [SU/SU]; Москва 121165, Кутузовский пр., д. 33, кв. 43 (SU) [SERBINENKO, Fedor Andreevich, Moscow (SU)]. КОБЦЕВ Алексей Васильевич [SU/SU]; Каменец-Подольский 281900, Хмельницкая обл., ул. Красноармейская, д. 9, кв. 41 (SU) [KOBTSEV, Alexei Vasilievich, Kamenets-Podolsky (SU)].

(74) Агент: ТОРГОВО–ПРОМЫШЛЕННАЯ ПАЛАТА СССР; Москва 103735, ул. Куйбышева, д. 5/2 (SU) [THE USSR CHAMBER OF COMMERCE AND INDUSTRY, Moscow (SU)].

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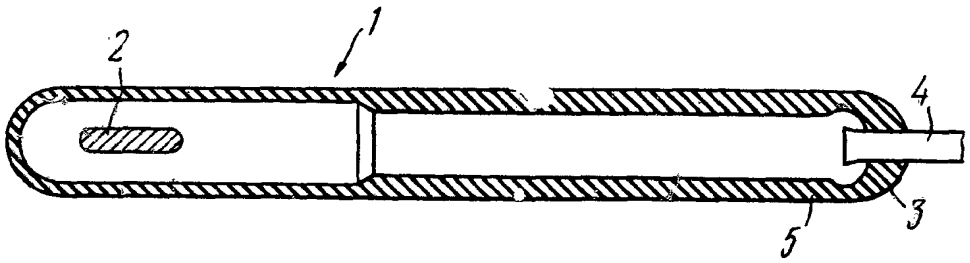

(57) Abstract

Occluding device comprising an inflatable balloon (1) connected through a sphincter (3) to an insertable catheter (4), the walls of said balloon being provided with at least one annular thickening around the sphincter (3).

(57) Реферат:

Окклюзирующее устройство, содержащее надувной баллон /I/, соединенный посредством сфинктера /3/ со вставным катетером /4/, причем стенки указанного баллона имеют по меньшей мере одно кольцеобразное утолщение вокруг сфинктера /3/.

ИСКЛЮЧИТЕЛЬНО ДЛЯ ЦЕЛЕЙ ИНФОРМАЦИИ

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OCCLUDING DEVICE

Technical Field

The invention relates generally to medicine, particularly to radiological surgery, and is concerned with occluding devices and is applicable for treatment of the various vascular diseases, specifically, vascular aneurysms and carrying out reconstructive vasoplastic surgery.

Prior Art

One of the most widespread diseases affecting human beings nowadays are vasculopathies of the brain, heart, and other organs. It is surgical treatment that is the most efficacious way of remedying the vascular diseases. Apart from being adequately effective, surgical treatment of vasculopathies and its practical implementation involves high degree of traumatism, sophisticated technique and high cost. Cerebrovascular surgery is accompanied rather frequently by complications concerned with further injury to the vitally important cerebral structures.

Of late radiological or endovascular surgery is gaining evergrowing application, which involves but low degree of traumatism, is readily available and entails minimum postoperative morbid complications.

Building-up and development of radiological surgery has called for fundamentally novel unprecedented devices for performing such surgical procedures.

Quite a number of devices for performing radiological surgery on blood vessels, e.g., catheters with detachable small-sized balloons (cf. FR, A, 2,361,124). One prior-art device consists of a catheter connected to a detachable balloon through a coupling. Detachable balloons may be of different construction, viz., with a thickened wall facing the balloon sphincter, with a self-sealing opening provided in the thickened wall opposite the sphincter. Manipulation with the balloon-catheter of the aforesaid construction is

carried out by its being introduced through a puncture needle into the vessel involved and brought to the pathologically changed vessel portion, followed by complete occlusion of the affected vessel by distending the ballon, filling it with a quickly sodifying matter, and removing the catheter. The device in question, however, finds but very restricted application due to imperfection of its construction and is only capable of completely cutting the morbid vessel out of the blood flow. Surgical procedures carried out with the aid of the present device are fraught with postoperative complications provoked by disturbed physiology of circulation.

Another occluding device close to that of the present invention is an occluding device made likeqise as a catheter with a detachable balloon (cf. GB, A, 2,II5,289). The device comprises a distensible balloon connected to a catheter through a coupling. A heating wire coil is put on the coupling and is electrically connected, via one or two wire conductors, to a source of electric current. The balloon is detached from the catheter by burning out or fusing the coupling.

Treatment of vascular diseases with the use of the aforediscussed device is carried out as follows. Having passed the device through the puncture needle one should approach it to the pathologically changed vessel portion, whereupon the balloon is distended by being filled with a quick-solidifying matter, thus attaining complete vessel occlusion. Then the wire coil heater is energized from the current source, whereby the coil heater burns out or fuses the coupling interconnecting the catheter and the balloon, the catheter is disengaged from the balloon and withdrawn along with the coil heater and wire conductors.

However, the aforementioned balloon is of a rigid construction and thereby fails to be introduced into the aneurysmal sac and the efferent vessels, which restricts prac-

tical application of the device. Thus, the device is only applicable for complete occlusion of large-calibre arterial vessels, while constructional imperfection of attachment and detachment of the balloon might result in some cases in severe morbid postoperative events.

An occluding device that proves to be the closest to that disclosed in this invention is the occluding device that has gained most widespread application and propagation, viz. the Debrun's balloon-catheter (cf. FR, A, 2,383,673). The device incorporates a catheter and a detachable distensible balloon provided with a built-in radiopaque marker, which is essentially a metallic clip located in a thickened portion of the balloon wall arranged opposite to the sphincter of the balloon. The latter sphincter is curved inwards into the interior of the balloon and of the catheter placed on the balloon outer wall. The catheter is provided with another movable catheter located over the main catheter. Upon cutting the aneurysmatic vessel out of the blood flow the balloon is detached from the catheter and both of them are then removed from the vessel.

The operative procedure for cutting the pathologically changed vessel portion out of the blood flow is carried out as follows.

The Debrun's balloon-catheter is introduced through a puncture needle into the affected vessel and is approached to the pathologically changed vessel portion. Thereupon the balloon is distended and filled with a quickly solidifiable matter, while the sphincter of the balloon starts turning inside out upon distending of the latter, with the result that the degree of the balloon-to-catheter adhesion is reduced. To complete disengagement of the balloon from the catheter, a second (accessory) catheter is put over the main ballon carrying catheter and made to slide along the vessel towards the balloon. As a result, the distended balloon is formly held in the vascular lumen. To remove the

ballon the main catheter is withdrawn from the vascular bed, while the sphincter is turned inside out. The accessory catheter is made to travel towards the balloon to put the balloon, as it were, from the main catheter. The balloon having been disengaged from the catheter, both catheters are extracted from the vessel operated upon. The Debrun's balloon-catheter features a rigid construction, thereby failing to provide penetration of the balloon into the efferent vessels and the aneurysmal chambers, which restricts practical application of the Debrun's balloon-catheter as a rule to stationary occlusion of the efferent vessels and the aneurysm-carrying vessels. This in turn affects drastically the blood supply and involves severy morbid postoperative events.

To detach the balloon from its carrying catheter much effort is to be applied, which is likewise fraught with danger. Even in cases of successful attempts to bring the Debrun's balloon-catheter into the chamber of an extensive aneurysm or a wide-neck aneurysm in order to cut it out of the blood flow, as many as ten balloons are necessary to be brought into the aneurysmal sac. However, when in the latter sac the balloons are fixed neither to one another nor to the aneurysmal wall, with the result that the ballons are liable to migrate in the aneurysaml sac and to get expelled therefrom by virtue of the blood flow, which in turn is causative of such most severe postoperative complications as ischemia and necrosis of organs and tissues of various degrees, various speech disturbances, dyskinesia of the lower and upper extremities, complex dysesthesia, and in some cases even of fatal outcomes. Besides, vascular aneurysms cut out of the blood flow with the aid of the heretofore-known balloons are liable to develop recurrent bleeding.

Applicability of the balloon-catheters described above is limited by their rigid construction, which prevents them to penetrate through siphon-shaped flexures of the internal

carotid artery. The balloons feature such a structure that makes it impossible to insert them into the aneurismal sac. With all the foregoing in view application of such balloons catheters for cutting saccular aneurysms out of the blood flow and carrying out reconstructive vasoplasty is much restricted.

An aim of the present invention is to ameliorate at least some of the problem of the prior art.

Accordingly, the present invention provides an occuluding device, comprising a detachable distensible balloon accommodating a radiopaque marker and connected, via a sphincter, to an insertable catheter, wherein the balloon incorporates at least one first annular bead or collar arranged round the sphincter.

An advantage of a preferred embodiment of the present invention is that it provides an occluding device that makes it possible, due to an appropriate construction arrangement of its balloon, to cut the aneurysms of minor and medium-caliber vessels out of the blood flow and to carry out reconstructive vasoplastic operations without disturbing physiological blood supply.

Furthermore, with a preferred embodiment of the present invention, the first collar makes it possible to get access of the second and third order vessels and of saccular aneurysms of said vessels to reliably cut them out of blood flow, making use of blood flow turbulence in the vessels, without disturbing physiology of circulation in the regions of said vessels. This enables also reconstructive vasoplastic surgery to be performed and false traumatic aneurysms to be cut out of blood supply.

It is expedient that the balloon have at least one isolated section filled with an adhesive substance, the outer wall of said section having a through perforation.

This enables one to deliver an adhesive and thrombosing agent which contributes to a reliable blocking of a small size aneurysmal sac by the balloon and makes is possible to reliably hold said balloon in the aneurysmal sac,

thus preventing postoperative complications caused by washing said balloon out of the aneurysmal sac by blood flow, as well as occlusion of vitally important blood vessels.

It is possible to provide the balloon with at least one additional annular bead or collar.

This adds to reliability of surgery for cutting medium- and large-size aneurysms out of blood flow and makes it possible to avoid relapses of the disease due to a stronger holding of the balloon in the aneurysmal sac attainable by the fact that a larger area of the balloon is bonded both with the thrombus and the aneurysmal wall.

It is practicable that at least one retaining element shaped as a hollow projection provided with side holes be installed on the surface of the balloon. This provides for a reliable blocking of small- and medium-size aneurisms having broad or narrow neck and precludes washing the balloon out of the aneurysmal sac due to increased adhesive forces of the thrombus with the balloon which is attained on account of thrombus penetration into the aforesaid hollow projection.

It is expedient that the catheter be made bifurcated.

This enables one to carry out X-ray-monitored surgery in hard-of-access places featuring extensive vascular bed.

Summary of the Drawings

In what follows the present invention will be illustrated by a description of some specific exemplary embodiments thereof to be considered with reference to the accompanying drawings, wherein:

FIG.I is a general longitudinal sectional view of an occluding device, according to the invention;

FIG.2 illustrates the occluding device of FIG.I while in action, according to the invention;

FIG.3 is a longitudinal sectional view of an occluding device incorporating an isolated section, according to the invention;

FIG.4 illustrates an occluding device incorporating an isolated section while inserted in the aneurysmal sac, according to the invention;

FIG.5 is a longitudinal sectional view of an occluding device provided with additional annular beads or collars, according to the invention;

FIG.6 illustrates the occluding device of FIG.5 while in working position, according to the invention;

FIG.7 presents the occluding device of FIG.5 while in the aneurysmal sac, according to the invention;

FIG.8 is a longitudinal sectional view of an occluding device provided with a projection on the side surface thereof, according to the invention;

FIG. 9 is an occluding device provided with a projection on its side surface while in the aneurysmal sac, according to the invention;

FIG.IO is a fragmentarily cutaway view of an occluding device provided with bifurcated catheters, according to the invention; and

FIG.II depicts an occluding device when applied for excluding the vascular aneurysm of the vertebrobasilar vascularity, according to the invention.

Preferred Embodiment of the Invention

The occluding device of the invention comprises a detachable distensible balloon I (FIG.I) provided with a radiopaque marker 2 and connected, through a sphincter 3, to an insertable catheter 4. According to the invention, the walls of the balloon I features an annular collar 5 arranged round the sphincter 3. When the balloon I (FIG.2) is introduced through a vessel 6 into an aneurysm 7, air is fed to the interior of the balloon I through the catheter 4. As a result, the end of the balloon I gets inflated and is entrained by the blood flow into the sac of the aneurysm 7, while the collar-shaped end 5 of the balloon I remains invariable as for size. Then the ballon end inserted into

the aneurysm 7 is still more inflated and brought into the aneurysm 7, whereas the marker is freely arranged in the balloon I which fills up the aneurysm 7.

The balloon I (FIG.3) of the occluding device being claimed herein may have at least one isolated section 8. FIG.3 presents such a section provided in the top portion of the balloon I; it should however be noted that the section 8 may be situated anywhere else in the ballon I and several such sections may be provided. An adhesive IO is contained in the section 8, which causes rapid thrombus-formation of the blood in the sac of the aneurysm 7 and reliable bonding of the balloon I together with the wall of the aneurysm 7.

Next the balloon I (FIG.4) introduced into the sac of the aneurysm 7 is distended and a quick-solidifying matter 11 is injected thereinto. While being distended the balloon I (FIG.4) increases in size, thus deforming the isolated section 8. Upon being deformed the section 8 exposes through perforations 9 through which the adhesive IO makes its way to the sac of the aneurysm 7, thus establishing reliable bonding of the wall of the aneurysm 7 together with the balloon I.

The balloon I (FIG.5) of the occluding device disclosed herein may have at least one additional annular collar I2. FIGS 5 and 6, according to the invention, represent two such annular collars I2 provided in the top portion of the balloon I; it should however be pointed out that a plurality of such annular collars I2 may be spaced differently apart.

Then the balloon I brought into the sac of the aneurysm 7 (FIG.7) is filled with the quick-solidifying matter II.

As a result, the balloon I, while being distended, acquires a definite shape depending on the dimensions of the annular collars I2 and of the spaces therebetween. The distended section 8 gets deformed, thus exposing the through perforations 9 through which the adhesive IO finds its way

to the sac of the aneurysm 7, thus causing blood I3 contained in the sac of the aneurysm 7 to form thrombus. The thus-formed thromous gets bonded together with the balloon I and the wall of the aneurysm 7, thereby excluding reliably the aneurysm 7 from the blood flow.

The occluding device of the invention may be provided with at least one retaining element I4 shaped as a hollow projection having side holes I5. FIG.8 presents the hollow retaining element I4 and the isolated section 8 provided on the side surface of the balloon I. The retaining element I4 may have any shape but it should be hollow and have the through holes I5. The number of the retaining elements I4, their mutual arrangement and position on the balloon I are not specified.

Once the balloon I has been introduced into the sac of the aneurysm 7, it is filled with the quick-solidifying matter II, the radiopaque marker 2 being in any position within the balloon I. While getting distended the balloon I closes the neck of the aneurysm 7, expands the isolated section 8 to expose the perforations 9, thus discharging the adhesive I0 into the sac of the aneurysm 7 to form the thrombus I3.

The thus-formed thrombus I3 gets bonded together with the balloon I and, making its way through the open-end perforations I5, passes through the retaining element I4, thus estabilishing additional links that hold reliably the balloon I in the sac of the aneurysm 7.

The occluding device of the invention may have a bifurcated catheter. FIG.I0 depicts the catheter I having two channels I6 and I7, merge quietly into a single-channel catheter. The dimensional ration of the single-channel and bifurcated catheters may be arbtirary.

The balloon I (FIG.II) is introduced into the sac of the aneurysm 7 of the vertebrobasilar vascularity via a femoral artery I8 and is then guided through an abdominal

aorta I9 and a vertebral artery 20. To monitor how the aneurysm 7 is being filled up a radiopaque agent is fed along the channel I6 of the catheter 4 and, as soon as the agent reaches the balloon I the channel I7 of the catheter 4 is closed. Upon extracting the radiopaque agent from the balloon I both of the channels I6 and I7 of the catheter 4 are opened.

The balloon I is filled with the quick-solidifying matter II via the channel I7 of the catheter 4 with the channel I6 of said catheter open and even at some negative pressure therein. Once the balloon I has been partially filled with the quick-solidifying matter II, the channel I6 of the catheter 4 is closed, whereupon the balloon I is filled with the quick-solidifying matter completely.

Having diagnosed a large-size aneurysm with a normal-size aneurysmal opening, one should select the balloon having two annular collars (FIGS 5,6). Then the artery is punctured with a special needle, whereupon the occluding device is passed into the artery 6 through the puncture needle, the isolated section 8 of the occluding device being filled with the adhesive-and-thrombosing agent IO, which is delivered, by virtue of surgeon's manipulations and of the blood flow, to the opening of the aneurysm 7.

Making use of the specific features of hemodynamics, the balloon I is brought into the sac of the aneurysm 7. Then the radiopaque agent is supplied along the catheter 4 to the balloon I, whereupon its position in the sac of the aneurysm 7 is monitored against the degree of filling with the radiopaque agent and by the radiopaque marker 2. Thereupon the radiopaque agent is let out of the balloon I along the catheter 4. Next the quick-solidifying matter II is syringe-injected into the ballon I through the catheter 4. While being distended the balloon I increases in size and fills up the sac of the aneurysm 7.

The walls of the balloon I are expended in different

degree due to the provision of the annular collers I2, with the result that the balloon I acquires an intricate shape (FIG.6). As a result, the isolated section 8 preliminary filled with the adhesive-and-thrombosing agent IC, gets deformed and the agent IC makes its way through the open-end perforations 9 to the sac of the aneurysm 7, thus causing the thrombus I3 to form, which encompasses the body of the balloon I and holds it reliably in the sac of the aneurysm 7 (FIG.7), while the catheter 4 retains the balloon I by virtue of the sphincter 3. Then while performing light manipulations (i.e., pulling at the catheter 4), one should to remove the catheter 4 from the balloon I and the sphincter 3 is drawn up.

The herein-proposed occluding device differs from all the heretofore-known balloon-catheters in its being capable of excluding from the blood flow arterial aneurysms of any location provided its diameter exceeds 0.5 mm and its neck is accessible for the ballon to introduce into the aneurysmal sac.

Industrial Applicability

It is extremely valuable that in a majority of cases the occluding devices of the invention are suitable for a reconstructive vasoplastic surgery, i.e., an ideal surgical procedure aimed at occluding the sac of an arterial aneurysm form blood circulation and retaining the passability of the cerebral artery carrying the aneurysm, or of such an artery of any other organ. A great deal of experience that has been amassed for many-year practice in treatment of patients suffering from arterial aneurysms demonstrates that endovascular exclusion of such aneurysms proves to be most physiological, highly efficacious and reliable and involves but minimized operation injury, whereas preservation of the parental vessel and occlusion of the aneurysmal sac testify to a fundamentally new and unprecedented aim of endovascular surgery for arterial aneurysms.

Using the occluding devices of the invention one can manage to effect reconstructive vasoplastic surgery in various carotid-cavernous anastomoses, to successfully exclude various arterio-sinusal anastomoses, and to conduct treatment of the vascular aneurysms of the abdominal viscera and the aneurysm of the abdominal aorta.

Endovascular surgery with the aid of the detachable balloon-catheters of the present invention when applied for false traumatic aneurysms of the cavernous portion of the internal carotid artery makes it possible to perform a reconstructive surgical procedure in a majority of patients, and thus becomes the operation of choice, since a reconstructive surgery can be performed in such aneurysms only with the use of the detachable balloon-catheters proposed herein.

Using easy-to-detach balloon catheters one can successfully exclude from circulation diverse intracranial and extracranial arteriovenous aneurysms. There is a good deal of many-year positive experience in treatment of arterial aneurysms by endovascular surgery.

Furthermore the occluding devices of the invention are in extensive application for treatment of carotid-cavernous and arteriosinusal anastomoses and for the vascular blockage of abundantly vascularized meningiomas. The devices have been employed to good advantage for occlusion of diverse arteries of internal organs, neck and brain.

The occluding devices of the invention provide for reliable prevention of bleeding due to possible recurrent ruptures of aneurysms and practically rule out rupture of the aneurysmal and vascular walls and tearing the vessels off the organs and tissues.

OCCLUDING DEVICE

Abstract of the Disclosure

An occluding device comprising a distensible ballon (I) connected through a sphincter (3) to an insertable catheter (4), the walls of the balloon having at least one annular bead or collar arranged around the sphincter (3).

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An occuluding device, comprising a detachable distensible balloon accommodating a radiopaque marker and connected, via a sphincter, to an insertable catheter, wherein the balloon incorporates at least one first annular bead or collar arranged round the sphincter.

2. An occluding device as claimed in claim 1, wherein the balloon incorporates at least one additional annular bead or collar spaced from the said first annular bead or collar.

3. An occluding device as claimed in either claim 1 or 2, wherein the balloon has at least one isolated section filled with an adhesive substance with the outer wall of the isolated section having a through perforation.

4. An occluding device as claimed in either claim 1 or claim 2, wherein the surface of the balloon incorporates at least one retaining element formed as a hollow projection provided with side holes.

5. An occluding device substantially as herein described with reference to the accompanying drawings.

DATED this 21st day of June 1991

KIEVSKY NAUCHNO-ISSLEDOVATELSKY INSTITUT NEIROKHIRURGII
By their Patent Attorneys
GRIFFITH HACK & CO

8748A/KLS/19.06.91

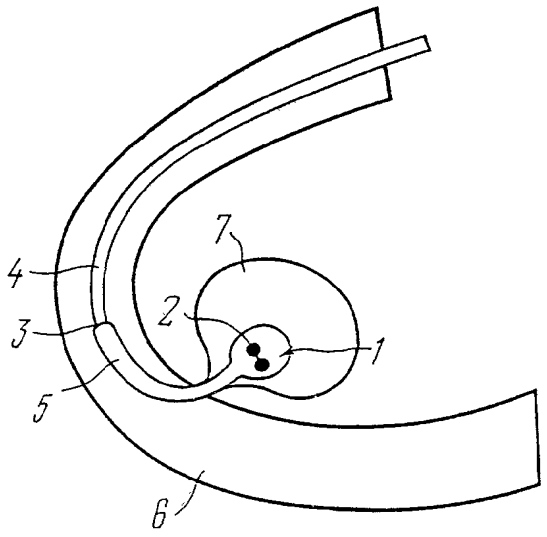

FIG.2

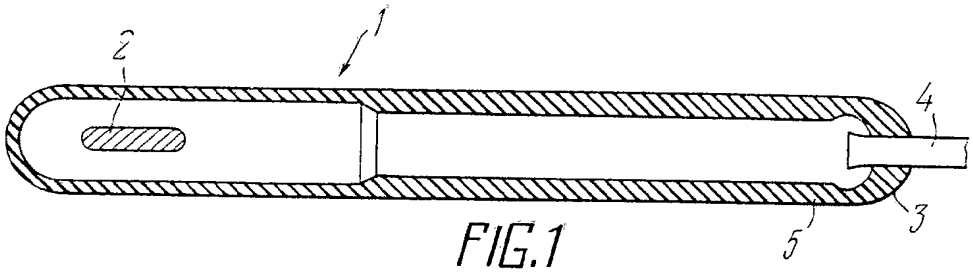

FIG.1

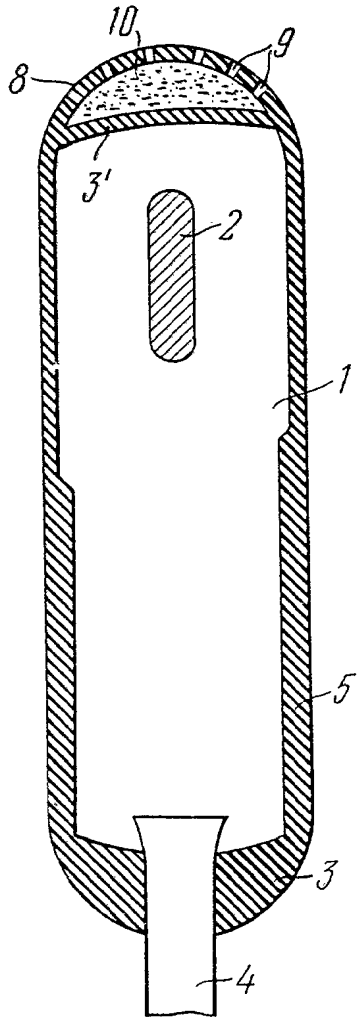

FIG. 3

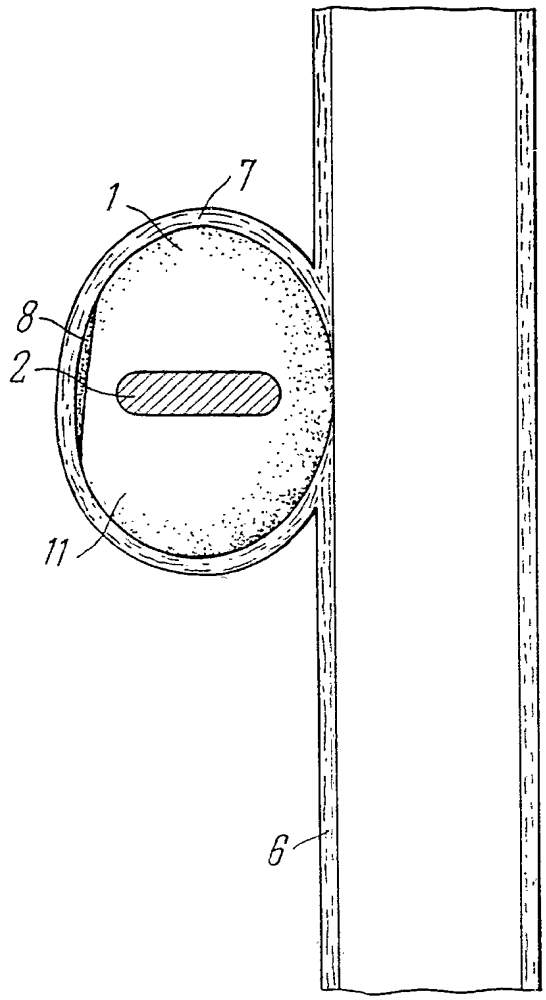

FIG. 4

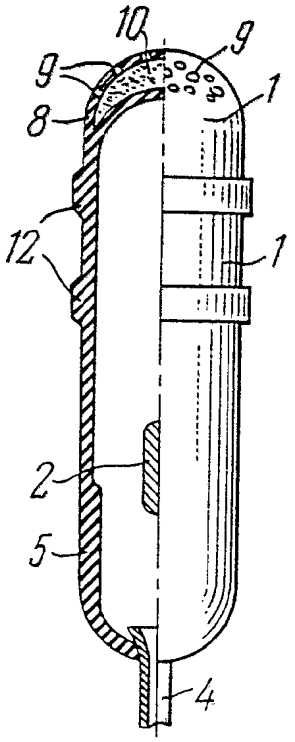

FIG. 5

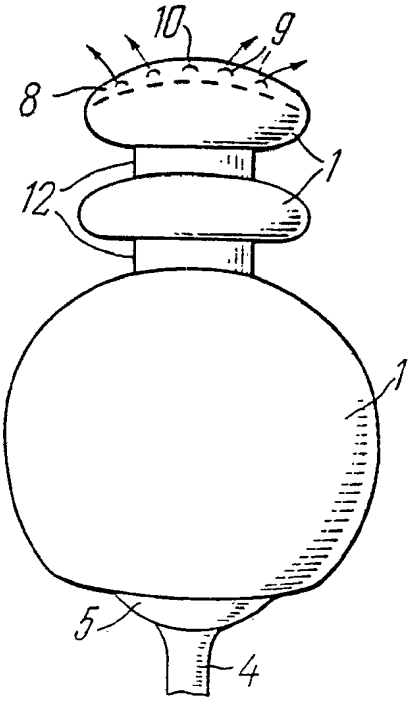

FIG. 6

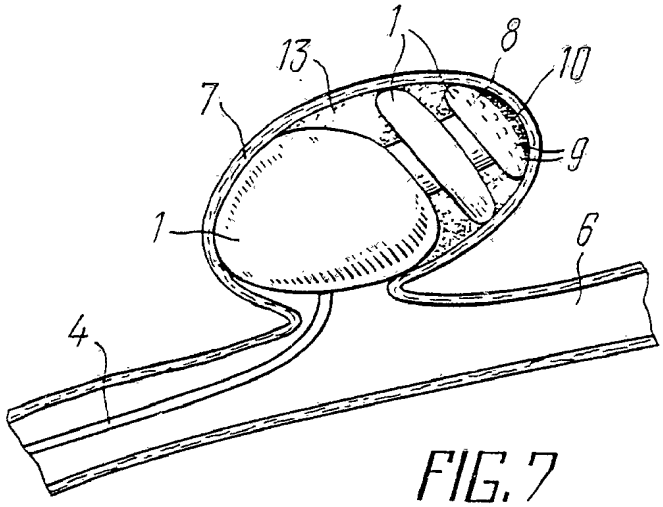

FIG. 7

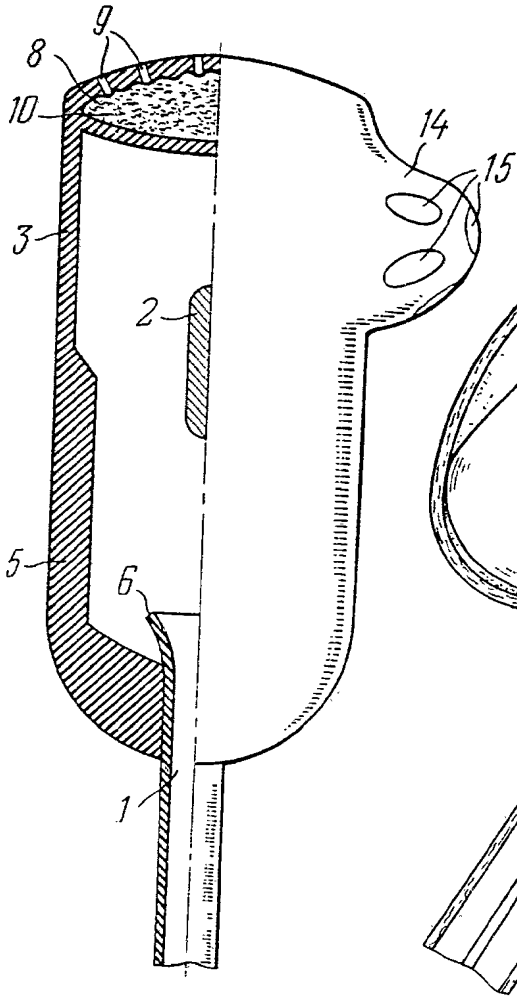

FIG. 8

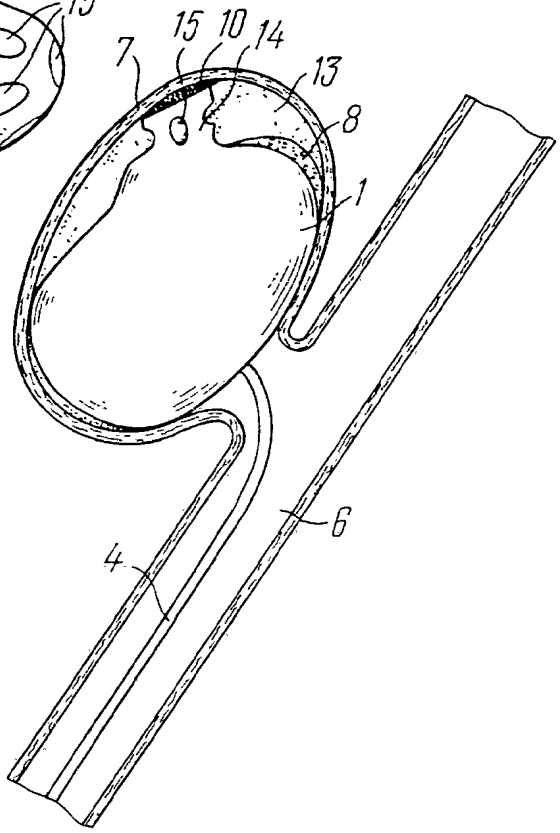

FIG. 9

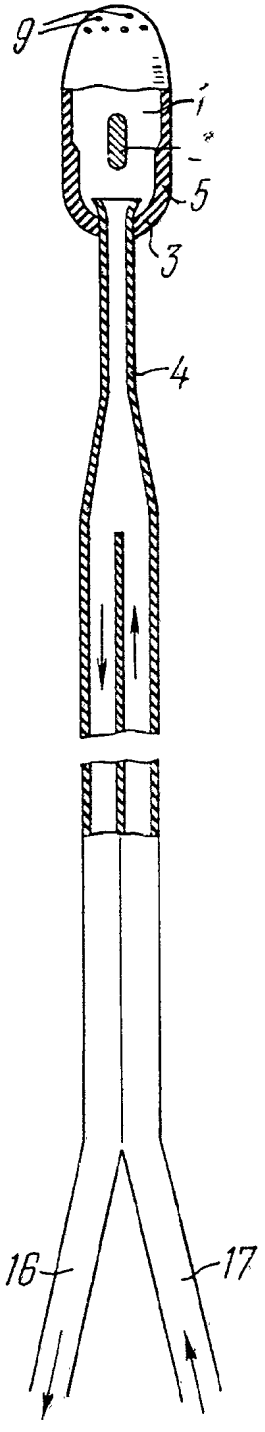

FIG.10

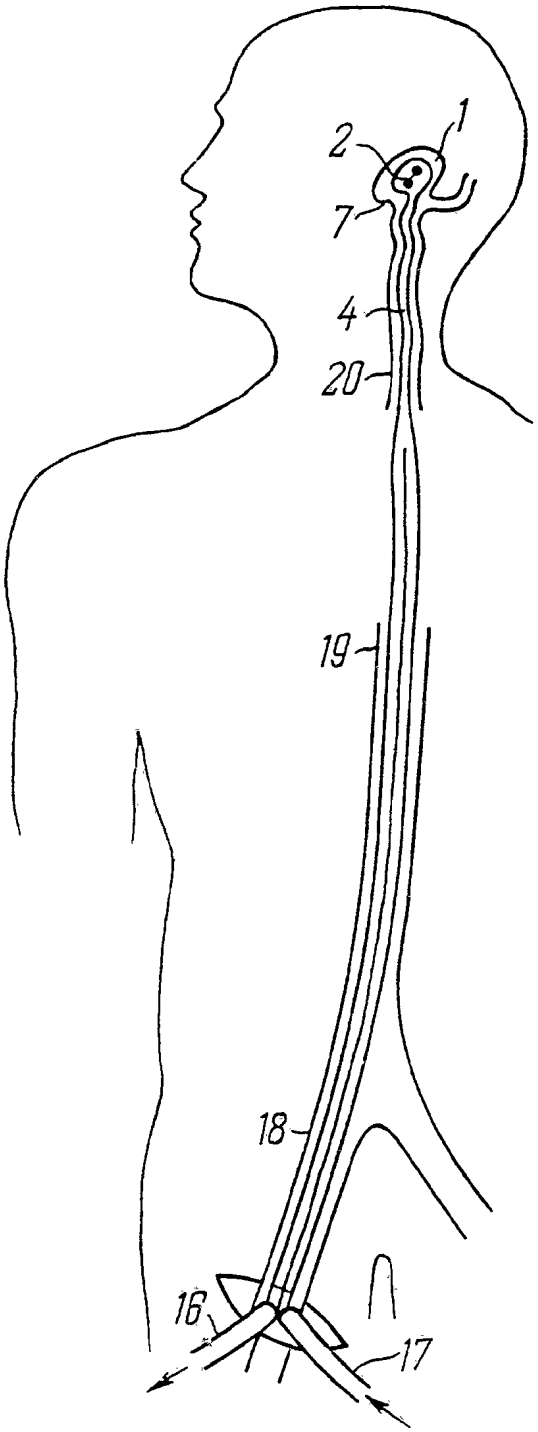

FIG.11

INTERNATIONAL SEARCH REPORT

International Application No PCT/SU 88/00021

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4] A61M 25/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	A61M 25/00

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	FR, A1, 2361124 (PEVSNER Paul Hershel) 10 March 1978 (10.03.78) see page 4, lines 8-14,figures 12,13;page 9,lines 10-23 (cited in the description)	3
A	FR, A1, 2383673 (Docteur DEBRUN Gérard) 13 October 1978 (13.10.78) see page 2, lines 23,24;figure 2,page 3,lines 27-35 (cited in the description)	5
A	SU, A1, 810246 (Kievsky nauchno--issledovatelsky institut neirokhirurgii) 10 March 1981 (10.03.81) see column 2,lines 5-30,figures 1,2	1

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26 December 1988 (26.12.88)	01 March 1989 (01.03.89)
International Searching Authority	**Signature of Authorized Officer**
ISA/SU	

ОТЧЕТ О МЕЖДУНАРОДНОМ ПОИСКЕ

Международная заявка № PCT/SU 88/00021

I. КЛАССИФИКАЦИЯ ОБЪЕКТА ИЗОБРЕТЕНИЯ (если применяются несколько классификационных индексов, укажите все;[5]

В соответствии с Международной классификацией изобретений (МКИ) или как в соответствии с национальной классификацией, так и с МКИ

МКИ[4] – A61M 25/00.

II. ОБЛАСТИ ПОИСКА

Минимум документации, охваченной поиском[7]

Система классификации	Классификационные рубрики
МКИ[4]	A61M 25/00

Документация, охваченная поиском и не входившая в минимум документации, в той мере, насколько она входит в область поиска[8]

III. ДОКУМЕНТЫ, ОТНОСЯЩИЕСЯ К ПРЕДМЕТУ ПОИСКА[9]

Категория*	Ссылка на документ[11], с указанием, где необходимо, частей, относящихся к предмету поиска[12]	Относится к пункту формулы №[13]
A	FR, AI, 2361124, (PEVSNER Paul Hershel), 10 марта 1978 (10.03.78), смотри с.4, строки 8-14, фиг. 12,13, с.9, строки 10-23; (указан в описании)	3
A	FR, AI, 2383673, (Docteur DEBRUN Gérard), 13 октября 1978 (13.10.78), смотри с.2, строки 23,24, фиг. 3, с.3, строки 27-35; (указан в описании)	5
A	SU, AI, 810246, (Киевский научно-исследовательский институт нейрохирургии), 10 марта 1981 (10.03.81), смотри колонку 2, строки 5-30, фиг. 1,2	1

* Особые категории ссылочных документов[14]:

„A" документ, определяющий общий уровень техники, который не имеет наиболее близкого отношения к предмету поиска.

„E" более ранний патентный документ, но опубликованный на дату международной подачи или после нее.

„L" документ, подвергающий сомнению притязание(я) на приоритет, или который приводится с целью установления даты публикации другого ссылочного документа, а также в других целях (как указано).

„O" документ, относящийся к устному раскрытию, применению, выставке и т. д.

„P" документ, опубликованный до даты международной подачи, но после даты испрашиваемого приоритета.

„T" более поздний документ, опубликованный после даты международной подачи или даты приоритета и не порочащий заявку, но приведенный для понимания принципа или теории, на кото... основывается изобретение.

„X" документ, имеющий наиболее близкое отношение к предмету поиска заявленное изобретение не обладает новизной и изобретательским уровнем;

„Y" документ, имеющий наиболее близкое отношение к предмету поиска; документ в сочетании с одним или несколькими подобными документами порочит изобретательский уровень заявленного изобретения, такое сочетание должно быть очевидно для лица, обладающего познаниями в данной области техники.

„&" документ, являющийся членом одного и того же патентного семейства.

IV. УДОСТОВЕРЕНИЕ ОТЧЕТА

Дата действительного завершения международного поиска	Дата отправки настоящего отчета о международном поиске
26 декабря 1988 (26.12.88)	01 марта 1989 (01.03.89)
Международный поисковый орган	**Подпись уполномоченного лица**
ISA/SU	Н.Шепелев

Форма PCT/ISA/210 (второй лист) (январь 1985г.)